The Reasons for Taking Photos instead of Taking Notes in Class among College Students Majoring in Mathematics

ABSTRACT: With the development of the College teaching and learning, some students majoring in mathematics have switched to using electronic devices to take photos instead of notes for recording. Exploring the causes of this phenomenon is of great significance to enhance students' learning in class and improve teachers' teaching. This study utilized the interview method and the interview was conducted with undergraduates majoring in mathematics who have the habit of taking photos in class. The conclusions drawn from this study are as follows: (1) Taking photos instead of taking notes is not satisfactory for learning. (2) The phenomenon of taking photos instead of taking notes can be attributed to the following factors: In terms of students, firstly, their learning concept is utilitarian and their learning motivation is weak. Secondly, some students are lazy about taking notes on non-exam content. Thirdly, some students have difficulty understanding the knowledge in class, so they took photos for after-class learning. Lastly, taking notes by hand is not organized enough. In terms of teachers, the fast pace of teachers' lectures and the lack of logic in teachers' lectures make it difficult for students to take notes. In other aspects, taking photos has the advantage of clarity and convenience. Furthermore, most of the students around are taking photos, which will lead other students to follow blindly. Based on the above analysis, in order to improve this phenomenon, it is suggested to improve students' note-taking ability, change students' learning concepts and improve teachers' information-based teaching level.

Keywords: College Students, Notes, Take Photos, Math Class

1. INTRODUCTION

The period of college is a golden time for students' individual development, knowledge reserve and ability growth. The university class focuses on the training of students' thinking and comprehensive ability. Notes, as an outward form of students' thinking in class, are a means of helping students construct knowledge. It helps learners to summarise their learning in their own words and increase the depth of

cognitive processing and understanding [1]. For students majoring in mathematics, their professional knowledge has the characteristics of logic and abstraction. Therefore, classroom notes play an important role in their learning. By reviewing the literature and observing the real situation, students majoring in mathematics have switched to using electronic devices to take photos instead of taking traditional notes in class. At present, scholars' research on the notes taken in class mainly contains two aspects, which are the functions of notes, and ways of taking notes. Most of the research on classroom note-taking is conducted at the high school and junior high school educational levels. There are fewer studies on the classroom note-taking behaviour of undergraduates, and none of them are specific to the classroom note-taking behaviour of undergraduates majoring in mathematics. Therefore, it is of great practical significance to explore the deep-rooted causes of the phenomenon of taking photos instead of taking notes in class among college students majoring in mathematics, which has practical implications for promoting students' learning in class as well as improving teachers' teaching.

The research question in this paper is: (1)What are the main causes of the phenomenon of taking photos instead of taking notes in class among college students majoring in mathematics? (2) Based on the results of the study, what are the countermeasures to improve the phenomenon of taking photos instead of taking notes of college students majoring in mathematics?

2. RESEARCH METHODS

2.1 Participants

This study was conducted on 30 college students majoring in mathematics who have the habit of taking photos instead of taking notes, including 11 males and 19 females. 6 in the first year, 4 in the second year, 7 in the third year, and 13 in the fourth year. 15 majored in Mathematics and Applied Mathematics, 3 majored in Data Science and Big Data Technology, 4 majored in Information and Computing Science and 8 majored in Statistics. Details of the survey sample are shown in **Table 1**.

Table 1: Survey Sample Situation

Category	Number	Percentage

Gender	Male	11	36.67
	Female	19	63.33
Grade	Freshman	6	20.00
	Sophomore	4	13.33
	Junior	7	23.33
	Senior	13	43.33
Major	Mathematics and Applied Mathematics	15	50.00
	Data Science and Big Data Technology	3	10.00
	Information and Computing Science	4	13.33
	Statistics	8	26.67

2.2 Instrument

2.2.1 Test Questions

The interview outline started with the curriculum and content of photos to understand the current situation of taking photos in class. After that, five questions were compiled from the dimensions of teacher factors, student factors, and other factors of taking photos to find out the multifaceted causes of taking photos in class. Finally, the interview questions were designed from the effects of taking photos to come up with the effects of taking photos on the learning of Mathematics students.

2.3 Data Collection

In this study, college students majoring in mathematics who have the habit of taking photos in class are recruited as interviewees, and the interviewees were screened to make the interview data more representative. After contacting the interviewees in advance, we conducted semi-structured interviews with them according to the interview outline and recorded them. Finally, a total of 30 interview data were collected.

2.4 Data Processing

After the interview, the interview data were processed as follows: First, the interview recording of each interviewer was converted into text, and then the data obtained from

the interview was encoded. Finally, the coding results were sorted out statistically.

3. RESULTS

3.1 The Current Situation of Taking Photos in Class

When asked, "What classes do you take the most photos of?" the majority of students said that they took the most photos in their Maths major classes, some said that they took the most photos in the last class at the end of the semester and in their public classes, a few said that they took the most photos in classes with a lot of group work and at the beginning of the semester, and a very small number of students took the most photos in the classes that were difficult to learn in. The statistical results of the survey are shown in **Table 2.**

Table 2: Coding Results for Types of Photographic Sessions

Code	Details	Number	Percentage
A1	Lessons with lots of group work	1	3.33
A2	Mathematics Speciality Courses	29	96.67
A3	Classes at the beginning of the semester	1	3.33
A4	Classes at the end of the semester	2	6.67
A5	Every lesson	1	3.33
A6	public course	2	6.67
A7	Lessons with learning difficulties	1	3.33

When asked, "What content do you take the most photos?" It was found that most of the students took the most photos when the teacher emphasized the key contents and the contents that would be tested in the examination. Lots of students said that they would choose to take photos when they recorded the contents that took a long time and were difficult to be understood in class. A small number of students took the most photos when the teacher explained the process of theorem derivation and the contents that were not in the textbook. A very small number of students said that they took the most photos of the course's assessment methods. The statistical results of the survey on the type of content to be photographed are shown in **Table 3.**

Table 3: Types of Photographic Content

Code	Details	Number	Percentage
B1	Key points emphasised by the teacher	11	36.67
B2	Theorem derivation process	3	10.00
B3	Coursework assigned by the teacher	2	6.67
B4	Content which is not mentioned in the textbook	5	16.67
B5	Content that will be tested in exams	9	30.00
B6	Content that takes a long time to record	9	30.00
B7	Content that is difficult to understand in class	11	36.67
B8	Assessment of the course	1	3.33

3.2 Learning Effect of Taking Photos instead of Taking Notes

The vast majority of the students thought that there were advantages and disadvantages of taking photos, while some others said that the results were average and not very good. Only a small number of students thought that taking photos was effective. A very small number of students said that the effectiveness depends on whether they organize them after class. The statistical results of the survey on the effect of taking photos and recording are shown in **Table 4.**

Table 4: The Effect of Taking Photos

Code	Details	Number	Percentage
C1	There are advantages and disadvantages	9	30.00
C2	Effectiveness depends on whether you organize yourself after class	1	3.33
C3	Effective	5	16.67
C4	Not very effective	8	26.67
C5	Fairly good	7	23.33

3.3 Personal Factors Leading to Photographic Records

In response to the question, "Why didn't you choose to take notes with a pen?" "What are your own factors that led you to choose to take photos instead of taking notes?", the majority of the students thought that taking notes with a pen was not

comprehensive enough and it was easy to miss the content. Most of the students said that the teacher's teaching content was not easy to understand in class so they chose to take photos to learn after class. Most students thought that they chose to take photos to record their notes because they were lazy. Some students thought that it was difficult to keep up with the pace of lectures, and mobile phone photos could record a lot of information in a short time, which was convenient and quick. A small number of students said that they sometimes could not see the blackboard, and the mobile phone photos were very clear. This is also an important reason why they choose to take photos. A small number of students also thought that taking photos with mobile phones could be viewed at any time, and the content recorded with a pen was not accurate enough, which led them to choose to take photos. In addition, a very small number of students chose to take photos because their handwriting was scribbled and not organized enough. The statistical results of the survey on the personal factors of taking photos and recording are shown in **Table 5.**

Table 5: Individual Factors in Photographic Records

Code	Details	Number	Percentage
D1	Pen records is insufficiently comprehensive and easy to miss the key points	17	56.67
D2	Existence of lazy mentality	13	43.33
D3	Pen records is not accurate enough and is prone to pen errors	1	3.33
D4	Difficult to keep up with the pace of the lecture when taking notes with a pen	9	33.33
D5	Difficult to see the blackboard, but mobile phone photos are clear	3	10.00
D6	Mobile phones can record a lot of information in a short time, which is convenient and fast.	9	30.00
D7	It is not necessary to take notes because it is easy to get high grades	8	26.67
D8	Notes are scribbled and not well organised.	2	6.67
D9	The study habit is to understand the knowledge in class and organise notes after class	3	10.00
D10	Teaching content is not understood in class so	17	56.67

	take photos to learn again after class		
D11	Phone photos can be viewed at any time	1	3.33

3.4 Teacher factors leading to photographic records

In response to the question "Why didn't you choose to take notes with a pen?" "Do you think the teacher's style of lecturing and the way of teaching had an influence on your choice to take photos?", the vast majority of the students thought that the speed of the teachers' lecture was too fast and it was difficult for them to keep up with the pace of the lecture, so they choose to take photos. Most of the students said that the teacher's explanations were abstract and difficult to understand, which made it difficult for them to comprehend, leading them to choose to take photos for notes. Some students said that the teacher would not leave time for students to take notes. Some other students thought that the teacher's lectures were different from the textbook, so they needed to record a lot of notes. A small number of students choose to take photos because their teachers do not provide class materials after class, the content of the lectures is different from the textbook. A very small number of students also said that some teachers would even guide students to take photos to record. The statistical results of the survey on the teacher's factor of taking photographs and records are shown in **Table 6.**

Table 6: Teacher Factors in Photographic Records

Code	Details	Number	Percentage
E1	Some teachers guide students to take photos to record notes	1	3.33
E2	The speed of the lecture is too fast and it is difficult to keep up with the pace of the lecture.	16	60.00
E3	Teachers do not provide courseware after class	3	10.00
E4	Teacher's pronunciation is not standard, unable to understand the content of the lecture	1	3.33
E5	Teacher's writing is not clear	4	13.33
E6	Teacher's lectures are different from the textbook, so you need to take a lot of notes.	6	20.00
E7	Too many words in the PowerPoint, difficult to	6	23.33

	record in a short period of time		
E8	The teacher reads from the textbook, which makes the students unable to participate in the class	4	13.33
E9	The teacher does not leave time for students to take notes	8	26.67
E10	Teacher's explanations are abstract and difficult to understand, making it difficult to comprehend	12	40.00

3.5 Other Factors Leading to Photographic Records

In response to the question "Why don't you choose to take notes with a pen?" "In addition to the two factors of teachers and students themselves, what other factors do you think led you to choose to take photos?" the majority of the students thought that the teacher's factor and their own factor were the main factors, and other factors had no influence on whether they choose to take photos. The majority of the students said that they are influenced by the students around them. Some students thought that the development of information technology influenced their choice of taking photos to take notes. A small number of students thought that mathematical knowledge was abstract and difficult to understand in class, so they chose to take photos to take notes. A very small number of students also said that whether they took photos or not depends on the teacher's classroom management. The survey statistics of other factors of taking photos to record notes are shown in **Table 7**.

Table 7: Other Factors in Photographic Records

Code	Details	Number	Percentage
F1	Maths knowledge is abstract and difficult to understand in class	2	6.67
F2	Whether the teacher's classroom management is strict	2	6.67
F3	The development of technology drives changes in classroom recording	3	10.00
F4	Influence of surrounding classmates	10	33.33
F5	No other factors	13	43.33

4. DISCUSSION

4.1 Learning Effect of Taking Photos instead of Taking Notes

The results of the interview revealed that only a small number of students thought that taking photographs was good for learning, and most of them could not make good use of taking photos to assist their learning. In conclusion, taking photographs was not effective for learning.

4.2 Personal Factors that Lead to Taking Photos instead of Taking Notes

4.2.1 Utilitarian Concept of Learning

Most of the mathematics majors choose to take photos in their professional classes and their photo content is mostly focused on the exam. Many students think that it is not fast enough to record the content with a pen, and they are always worried that they will miss the key content of the exam, so they choose to take photos to record it. It can be seen that many mathematics majors have a very utilitarian concept of learning. This leads students to pay too much attention to the key points of the exam. And taking photos can record the examination focus comprehensively in a short time, which also leads to the mathematics majors choosing to take photos to record the examination focus.

4.2.2 Weakness of Learning Motivation

Taking notes is a kind of learning behavior, which needs to be guaranteed by a certain learning motivation. According to the above statistics, many mathematics majors said that they chose to take photos because they had a lazy mentality, thinking that it was too tiring to take notes with a pen. Furthermore, it is not difficult to find that many students' academic pressure is small and it is easier to pass the course, which leads to the weakening of many students' learning motivation. They don't pay enough attention to taking notes and are too lazy to take notes in class.

4.2.3 Difficulty in Comprehending the Teacher's Lectures in Class

From the above statistics, it is found that the vast majority of students take the most photos in the mathematics major class, and most of them will choose to take photos of what they have difficulty understanding in class. Through interviews, the author found that many mathematics majors have difficulty digesting the content of the teacher's explanation in class. Many students find it especially difficult to learn the derivation and proof of theorems, and it is difficult for them to follow the teacher's ideas in class. Therefore, they choose to take photos to record them first, and then study them after class.

4.2.4 Lack of Note-taking Skills

The above statistics show that some students feel that their handwriting is scribbled and not organized enough, so they are reluctant to take notes with a pen. Many students think that they have to take notes on whatever the teacher says, fearing that they might miss a word. Therefore, many students' notes are almost a copy of the teacher's coursework. They neglected the fact that note-taking lies in the reinforcement of core ideas. As a result, many students' note-taking ability is deficient, which directly leads to the fact that it is difficult for them to keep up with the pace of the teacher's teaching by taking notes with a pen, and they are eventually forced to choose to take photos to record their notes.

4.3 Teacher Factors that Lead to Taking Photos instead of Notes

4.3.1 Constraints on Teachers' Pedagogical Capacity

The results of the interviews showed that most of the students chose to take photos to record their notes, mainly because the teacher's lectures were too fast-paced and it was difficult for students to keep up with the pace of the lectures by taking notes. Some students also thought that the teacher did not leave time for note-taking in class. It can be seen that the teacher's pace of lecture has an influence on whether students choose to take notes with a pen.

The second is the logic of the teacher's lectures. A logical and organized class helps students to grasp the structure and main lines of the content. The results of the interviews showed that most of the students thought that they would choose to take photos when the teacher's explanations were abstract and difficult to understand,

making it difficult for them to comprehend. A small number of students said that when the content of the teacher's lectures is different from the textbook, they need to take a lot of notes, and they would tend to take photos to record them. It can be seen that the logic of the teacher's lectures has an important influence on whether students take notes or not.

4.3.2 Teachers' Classroom Management

The interview statistics show that when the teacher's classroom management is strict and students are not allowed to use mobile phones in class, students will choose to take photos to record their notes. On the contrary, some students said that their teachers knew that they were not keen to listen in class, and when coming to some important content, their teahcher would guide them to take photos to record notes, thus letting students develop the habit of taking photos subtly. It can be seen that teachers' classroom management also has a certain influence on whether students choose to take photos to record their notes.

4.4 Other Factors that Lead to Taking Photos instead of Taking Notes

4.4.1 Development of Information Technology

Mobile phone can record a large amount of information in a short time, which is convenient and fast. What’s more, mobile phone photo records can be looked over anytime and anywhere. It can be seen that with the development of the times, the mobile phone has become a convenient tool for note-taking. Many students feel the convenience of taking photos and thus choose to take photos instead of taking notes.

4.4.2 Influence of Peers

Through the interviews, many students believed that the students around them had a subtle influence on them. Many students saw that the students around them were taking photos of certain content and worried that they would miss the key points, so they followed this trend and chose to take photos. Therefore, whether they choose to take photos to record their notes is also related to the note-taking behavior of the students around them.

5. CONCLUSION

5.1 Conclusions of the research

Taking photos to record is not effective. Most of the students can not make good use of taking photos to assist their study. The causes of photo-taking instead of note-taking for mathematics undergraduates include teacher factors, student factors, and other factors. Student factors include four aspects: utilitarian concept of learning, weakening of learning motivation, difficulty in understanding classroom content on the spot, and lack of note-taking ability. Teachers' factors include the constraints of teaching ability and teachers' classroom management. Other factors include the development of information technology and the influence of peers around them.

5.2 Countermeasures and suggestions

5.2.1 Enhancing Students' Note-taking Skills

Electronic devices taking photos provide students with unprecedented ease of access to teaching resources. Therefore, the cultivation of students' note-taking ability becomes more and more important. In the author's opinion, for college students, lectures on how to take notes should be carried out, selection and exhibition activities of excellent notes should be held, and teachers should consciously teach students scientific note-taking methods in class.

5.2.2 Reversing Students' Concept of Learning

Many students have not set up a correct concept of learning, thinking that learning is only to cope with examinations. Therefore, students majoring in mathematics should be helped to cultivate appropriate learning motivation. Schools should carry out teaching reforms, change the view of teaching which is mainly based on the transmission of knowledge, strengthen the connection with society, let students have more contact with social practical activities, and stimulate students' desire to actively explore knowledge in practical activities.

5.2.3 Enhance the Level of Informatisation Teaching of College Teachers

Many college teachers do not have a special systematic study of education and

teaching theory. Some of them lack language expression ability, and some of them have poor teaching organization ability. All of these affect classroom teaching to a certain extent, which in turn leads to students' difficulty in understanding classroom content. Therefore, it is necessary to strengthen the post-service training of teachers and improve the level of informatization teaching of college teachers.

6. DEFICIENCY AND PROSPECT

The shortcomings of this study are as follows: Firstly, this study qualitatively analyses the causes of taking photos through the interview method. The sample size of this study is limited, and more research subjects can be selected in subsequent studies. Secondly, the interview method is subjective and has some limitations, and the subsequent study can combine quantitative research with qualitative research.

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